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CANADIAN FARM FUEL AND FERTILIZER: PRICES AND EXPENSES

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CANADIAN FARM FUEL AND FERTILIZER: PRICES AND EXPENSES

Expenditures for fuel and fertilizers represented about 15% of farm operating expenses in Canada in 2009. Prices of fuel for farm machinery in Canada decreased in 2009 from the record highs reached in 2008, but are forecast to increase in 2010. After also reaching record highs in 2008, fertilizer prices dropped in 2009 and will continue to decline in 2010. This issue of the Market Outlook Report examines the situation and outlook for farm fuel and fertilizer prices and expenses in Canada for 2009-2010.

Primary production and profitability in the agricultural industry is highly dependant upon the cost of fuels and fertilizers. Figure 1 shows the components of 2009 Canadian farm operating expenses¹. Fuel and fertilizer costs accounted for 15% of total Canadian farm expenses, or \$5.1 billion. For every one cent per litre increase in fuel prices, Canadian farmers' annual machinery fuel bill increases by about \$25 million. For fertilizer, every one cent per kilogram increase in the price adds about \$54 million to Canadian farmers' annual fertilizer bill.

After increasing by 76% between 2004 and 2008, farm fuel prices in Canada tumbled upon rapid and substantial reduction of energy demand in the wake of the global economic contraction in 2009.

¹ (1) Rent includes cash rent and share rent; (2) Utility expenses include electricity, telephone and heating oil; (3) Other expenses include taxes, repairs to building and fences, irrigation, twine & wire, crop insurance premiums, AI & vet, business insurance, stabilization premiums, legal and accounting fee, and miscellaneous expenses.

Figure 1

CANADA: FARM OPERATING EXPENSES, 2009

Total \$35.2 Billion

Other Expenses	17.5%	\$6.2
Utility	4.7%	\$1.6
Rent	4.8%	\$1.7
Custom Work	3.1%	\$1.1
Machinery Repairs	7.0%	\$2.5
Livestock Purchases	3.5%	\$1.2
Seeds	4.2%	\$1.5
Pesticides	6.9%	\$2.4
Interest	6.7%	\$2.4
Farm Labour	12.3%	\$4.3
Feed	14.7%	\$5.2
Machinery Fuel	5.2%	\$1.8
Fertilizer	9.3%	\$3.3

Source: (1) Statistics Canada; (2) AAFC calculations.

However, the global economic recovery is expected to push fuel prices higher in 2010.

Fertilizer prices in Canada have risen steadily since 2005, but increased sharply to historical highs in 2008, up 64% from 2007. However, fertilizer prices declined in 2009 as a result of falling commodity prices, restricted availability of credit, and rapid and substantial reduction in energy prices. In 2010, fertilizer prices will continue to decrease in response to the weak worldwide fertilizer demand and low natural gas prices.

FARM MACHINERY FUEL

Farm machinery fuel consists mainly of diesel and gasoline, but also includes lubricants. The price of fuel is generally determined by the forces of global supply and demand and the agricultural sector is largely a price taker for both diesel and gasoline.

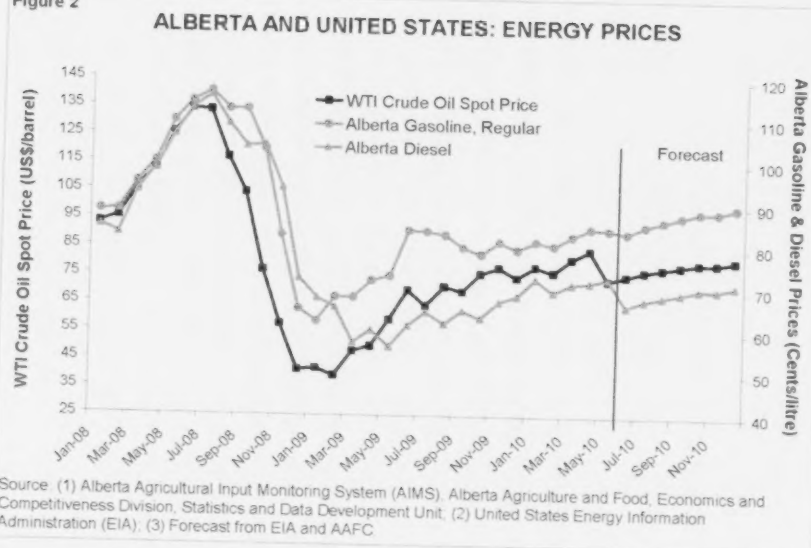
FUEL PRICES

The Canadian agricultural sector relies heavily on petroleum to meet a variety of energy needs. Canadian fuel prices follow US energy prices closely. *Figure 2* shows the actual and forecasted energy price pattern in the US and Canada during 2009 and 2010. The West Texas Intermediate (WTI) crude oil price averaged US\$62 per barrel in 2009, 38% lower than in 2008.² Agriculture and Agri-Food Canada (AAFC) estimated that the prices paid by Canadian farmers for farm machinery fuel decreased by about 30% in 2009 from 2008. This translated into about a \$814 million decrease in Canadian farmers' machinery fuel bill for 2009.

The global economic recession, which depressed world energy demand, contributed to weak oil prices in 2009. Nonetheless, global economic recovery will lead to a rebound in energy demand and push fuel prices higher in 2010. The EIA projects (July 7, 2010) the price for WTI crude oil to average US\$79 per barrel in 2010, up 28% from the 2009 average. Diesel prices are projected to show a 21% increase while gasoline prices are forecast to rise by 18% in 2010 in the US. Based on the information available up to July 2010, AAFC expects that fuel prices for farm machinery in Canada will increase by about 7% in 2010 compared to 2009. However, if global economic growth rebounds faster than expected, fuel demand could experience stronger growth and fuel prices could creep higher later in 2010.

² Estimated by the US Energy Information Administration (EIA) in July 7, 2010

Figure 2



FARM FUEL USAGE

Elasticity is estimated by economists to gauge the responsiveness of demand or supply to changes in price of a product. Using 28 years of historical data from Statistics Canada, the elasticity of demand for the price of fuel in Canada was estimated at -0.15. This means that, on average, when fuel prices rose 10% Canadian farmers reduced fuel usage by 1.5%. Farmers' demand for fuel is relatively insensitive to price changes in the short term because fuel is a necessity for farming and there are no immediate substitutes for fuel. *Figure 3* illustrates the inverse relationship between fuel price and fuel usage over 1981-2008.

Figure 4 indicates that farmers' fuel usage was actually quite steady, averaging a 0.5% annual growth rate, with fuel prices fluctuating at around 1.6 of the fuel price index (base year=1980) over the 1981-1999 period. However, the volume of fuel used by farmers decreased by an average of 2% annually over 2000-2008 following a string of continuous hikes in fuel prices after 1999. Therefore, although higher fuel prices reduce farmers' fuel usage in one year, the increase would have to persist for a longer period of time in order to reduce the fuel consumption trend. In response to higher fuel prices, farmers alter their techniques of production by, for example, choosing more efficient tractors, combines and other farm equipment to reduce tillage, or reducing the number of passes across fields by combining operations to save fuel.

In terms of the estimated elasticity and other factors such as seeded and harvested area, Canadian farm machinery fuel usage was estimated to have

declined by 2% in 2009 due mainly to lower seeded and harvested acres. In 2010, AAFC projects Canadian farm machinery fuel usage will continue to decrease by 3% as excessive rains in June led to severe flooding in the Prairies, which left a large area of unseeded acreage.

FARM FUEL EXPENSES

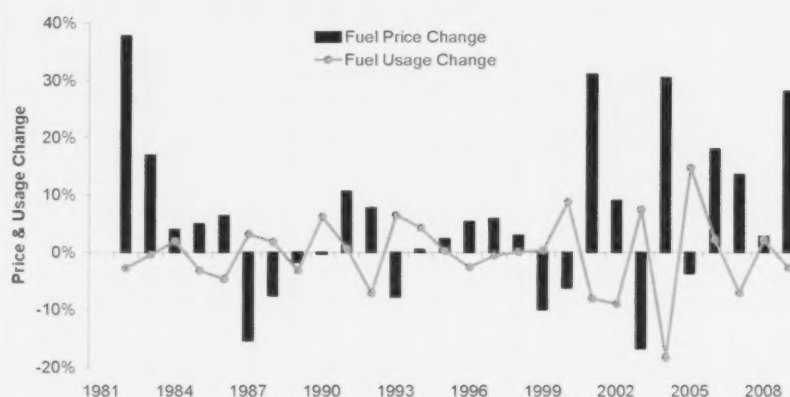
Given the change in both price and quantity, Canadian farm machinery fuel expenses were estimated to be \$1.8 billion in 2009, a decrease of 32% over 2008 but below the 2004-2008 average annual expenses of \$2.1 billion. Total expenses for farm machinery fuel are forecast to increase by 3% to \$1.9 billion in 2010.

FARM FERTILIZERS

Canada is one of the world's major producers of fertilizer, particularly nitrogen and potash. Canada exports about 95% of its potash production and about a quarter of its nitrogen production, mainly to the U.S. Canadian fertilizer production is primarily located in Alberta and Saskatchewan.

Figure 3

CANADA: FARM MACHINERY FUEL PRICE AND USAGE CHANGES FROM PREVIOUS YEAR



Source: (1) Statistics Canada and AAFC; (2) AAFC calculations.

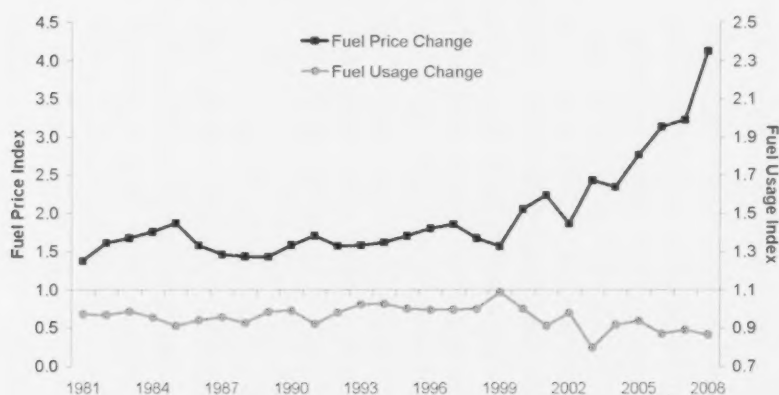
FERTILIZER TYPES IN CANADA

Fertilizer contains three key nutrients: nitrogen, phosphate and potash. The nitrogen fertilizers that are currently used in Canadian agriculture mainly include anhydrous ammonia, urea, nitrogen solution, ammonium nitrate and ammonium sulphate. The phosphate fertilizers are monoammonium phosphate (MAP) and diammonium phosphate (DAP) both produced from phosphate rock. The other major nutrient used in crop production is potash fertilizer, which is important in soybean and corn production. Most

potash deposits in North America are found in Canada, primarily in Saskatchewan.

Figure 4

CANADA: LONG-TERM TRENDS IN FARM MACHINERY FUEL PRICE AND USAGE (BASE YEAR=1980)



Source: (1) Statistics Canada and AAFC; (2) AAFC calculations.

Figure 5 shows the usage of major types of fertilizers in Canadian agriculture in 2007 and 2009. Nitrogen fertilizers were the largest nutrient used in agricultural production, accounting for 75% of total fertilizer usage, or about 4.1 million tonnes in 2009. The usage of nitrogen increased by an annual

growth rate of 4% from 2007 to 2009. With urea representing the largest volume used, Phosphate fertilizers accounted for 22% of total fertilizer usage, or about 1.2 million tonnes. Potash fertilizer accounted for 4% of total usage, or about 0.2 million tonnes in 2009.

DETERMINATION OF FERTILIZER PRICES

The traditional components of determining fertilizer prices are production costs, market demand and competition. However, other factors, such as exchange rates and government policies, also have an effect on fertilizer pricing.

Production Costs

Anhydrous ammonia is the primary component of nearly all the nitrogen fertilizer produced in the world. Ingredients for the production of anhydrous ammonia are air, natural gas and steam, with natural gas accounting for 70-90% of the production cost of ammonia. Therefore, nitrogen fertilizer prices would be expected to be very responsive to

changes in natural gas prices. Figure 6 illustrates that nitrogen fertilizer prices generally track natural gas prices and that higher natural gas prices directly impact nitrogen fertilizer prices.

The correlation between the price of natural gas and the price of nitrogen fertilizer was estimated at 0.74 based on monthly data over 1991-2009. However, this tight relationship did not always hold. For example, in the mid-1990s strong fertilizer demand, in combination with near full industry capacity utilization, kept fertilizer prices high despite low natural gas prices. A similar situation happened during 2007 and 2008. Therefore, when the supply

is unable to keep up with the demand, nitrogen prices can react independently of the price of its natural gas feedstock.

Three raw materials are required to produce the phosphate fertilizers of MAP and DAP, namely phosphate rock, sulfur and ammonia. Figure 7 demonstrates how increased phosphate rock and sulfur prices had profound implications on

Figure 5 CANADA: FERTILIZER TYPES AND USAGE, 2007 AND 2009

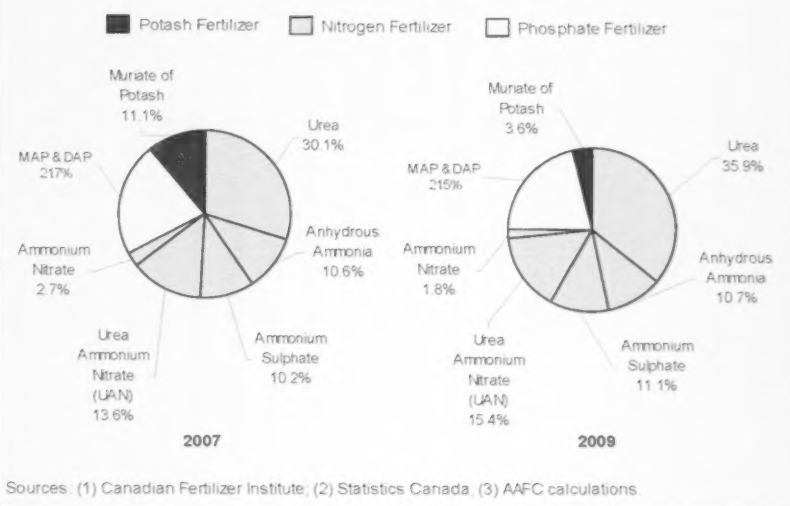
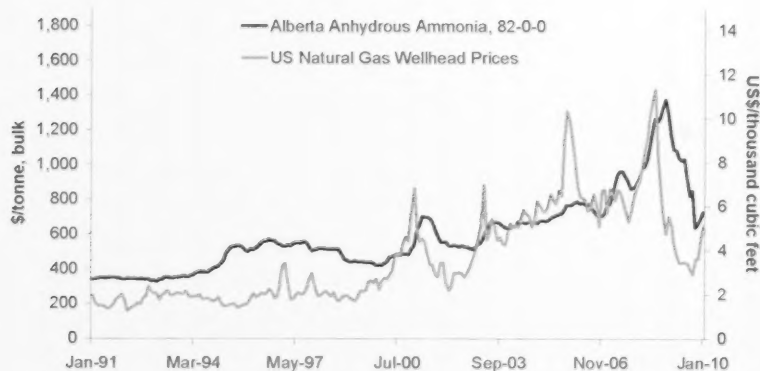


Figure 6 ANHYDROUS AMMONIA & NATURAL GAS PRICES

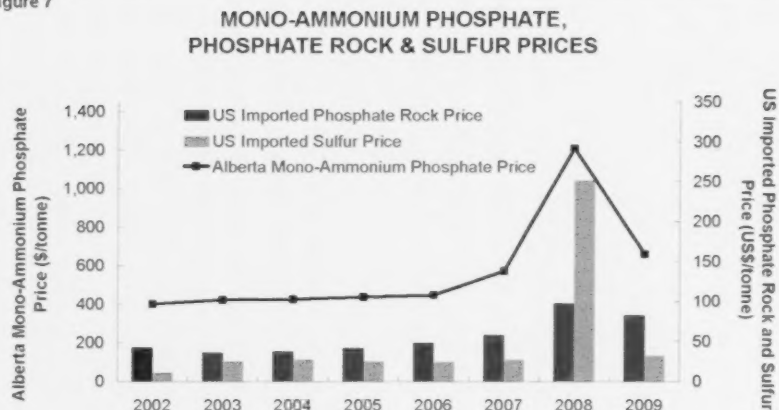


Source: (1) Alberta Agricultural Input Monitoring System (AIMS), Alberta Agriculture and Food, Economics and Competitiveness Division, Statistics and Data Development Unit; (2) United States Energy Information Administration.

phosphate fertilizer prices in recent years. The prices of phosphate rock and sulfur generally remained flat with no significant variability before 2007. However, the global phosphate rock and sulfur markets began to tighten in 2007 and this tightening continued in 2008 because of strong demand for phosphate fertilizer and limited additions of capacity. The dramatic increase of their prices during 2007 and 2008 significantly drove up phosphate fertilizer price.

In addition, the price of fertilizer at the retail level is also affected by prices for gasoline and diesel because transportation costs represent an important part of the cost of marketing fertilizer. Therefore, higher fuel prices can also drive up fertilizer prices through their impact on the transportation component of fertilizer prices at the retail level.

Figure 7



Source: (1) Alberta Agricultural Input Monitoring System (AIMS), Alberta Agriculture and Food, Economics and Competitiveness Division, Statistics and Data Development Unit; (2) The United States Geological Survey; (3) US Census Bureau data as adjusted by US Geological Survey and PentaSul North America Sulphur Service; (4) AAFC calculations.

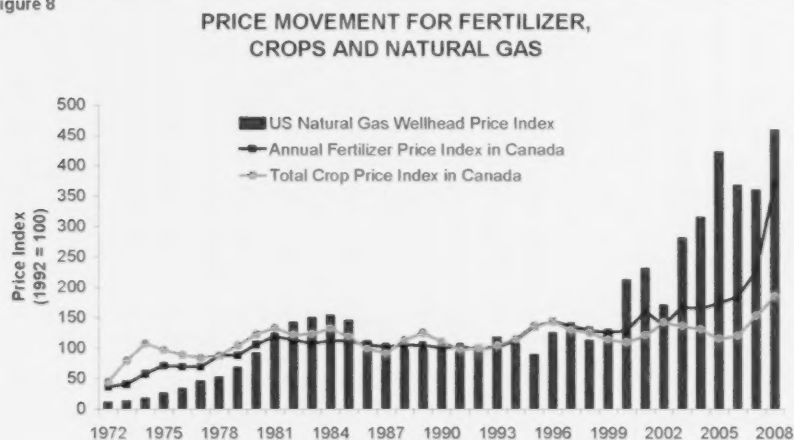
Market Demand

As in the case of fuel, fertilizers are internationally traded commodities and their prices are also determined by global supply and demand factors. The world demand for agricultural commodities is rising, driven by growing populations, an increase in demand for meat, and strong government support for biofuel initiatives. The rising demand has had a huge impact on agricultural commodity prices. High commodity prices generate large profit margins for farmers, which encourages them to increase fertilizer usage to boost yields as a means of increasing production. The increased global demand for fertilizer in recent years, mainly

attributed to high agricultural commodity prices, had substantially driven up fertilizer prices. Figure 8 shows how fertilizer prices responded to agricultural commodity prices in Canada.

Fertilizer prices in Canada generally moved in tandem with agricultural commodity prices in most of the years over 1972-2008. For example, strong world demand for fertilizer, supported by favorable crop

Figure 8



Sources: (1) Statistics Canada; (2) United States Energy Information Administration; (3) Forecast for 2008 fertilizer price from AAFC; (4) AAFC calculations.

prices, drove fertilizer prices to historical highs in Canada in 2007 and 2008. Nevertheless, this direct relationship has sometimes been more than offset by effects of interactions with natural gas prices. For example, in 2003, strong natural gas prices pushed fertilizer prices high despite low commodity prices. Conversely, in 2002, weak natural gas prices kept fertilizer prices low in spite of high commodity prices.

Competition

Canada is one of the world's major exporters of fertilizer, but also an important importer. In 2007, Canadian fertilizer exports represented 44% of production shipments while imports accounted for 28% of domestic fertilizer consumption. By far the largest portion of Canadian fertilizer exports are destined for the US while most of the fertilizer imports are also from the US. With increasing globalization and market liberalization, Canadian fertilizer production targeted at domestic markets experiences competition from imports. Meanwhile, Canadian fertilizer exports also meet international competition in global markets. Figure 9 presents the measures of exposure to foreign competition for the Canadian fertilizer industry over 2002-2007.

The import penetration rates³ show the high magnitude of foreign competition within the domestic market faced by Canadian phosphate fertilizer producers. Meanwhile, Canadian nitrogen fertilizer producers confronted relatively little foreign competition, and potash producers faced almost no foreign competition as the domestic market was supplied almost exclusively by domestic production. When domestic and global markets are considered together, the rates of exposure to international competition⁴ show that Canadian potash producers were exposed to the highest level of foreign competition, followed by phosphate fertilizer producers.

Given foreign competitors within domestic and global markets, Canadian fertilizer suppliers may

³ Import Penetration Rate = imports/consumption*100.

⁴ Rate of Exposure to International Competition = (exports/production + (1-exports/production) * (imports/consumption))*100.



have little choice but to match the market price or even underprice fertilizers in order to establish a market share. However, with high concentration in the fertilizer industry, one could expect less competition due to the interdependency among a small number of firms, which might have an important effect on fertilizer prices. In addition, the strength of export fertilizer associations, such as the US Phosphate Chemical Export Association and the world's largest exporter of potash, CANPOTEX in Canada, also has a strong influence in setting fertilizer prices in global markets.⁵

Other Factors

Canadian dollar exchange rates also have an effect on fertilizer pricing as Canadian fertilizer prices either rise or decline to the level of import prices to remain competitive. Figure 10 illustrates that Canadian fertilizer prices seem to capture long-run movements in Canadian dollar exchange rates. Apparently, an appreciation of the Canadian dollar has had a beneficial impact on fertilizer prices for Canadian farmers. For example, when the Canadian dollar rose an average of 6 cents in 2004, US fertilizer prices increased by 13% while Canadian fertilizer prices declined by 2%. In addition, as US fertilizer prices continued to increase by 17% in 2005, Canadian fertilizer prices were only up by 6% due to the continued appreciation of the Canadian dollar.

⁵ Wen-yuan Huang, February 2009, "Factors Contributing to the Recent Increase in U.S. Fertilizer Prices, 2002-08", United States Department of Agriculture.

Besides exchange rates, different governmental trade policies affecting major fertilizer exporters and importers can influence fertilizer prices in global markets. For example, with global short supplies of fertilizers, higher export tariff rates on urea, DAP and MAP implemented by China in 2008 further tightened the world fertilizer supplies and likely resulted in higher fertilizer prices than would otherwise have been expected during 2008 and 2009.

FERTILIZER PRICES

In 2009, a combination of falling crop prices and restricted availability of credit as a fallout of the global economic contraction reduced world fertilizer demand. Consequently, it induced an easing in the global fertilizer market balance, resulting in price weakness through 2009. Meanwhile, a decline in energy prices also helped to lower fertilizer prices. Figure 11 shows prices of the major types of fertilizer, as well as the percentage changes of prices in 2009 as compared to 2008 in Ontario, Manitoba and Alberta. AAFC estimated that the

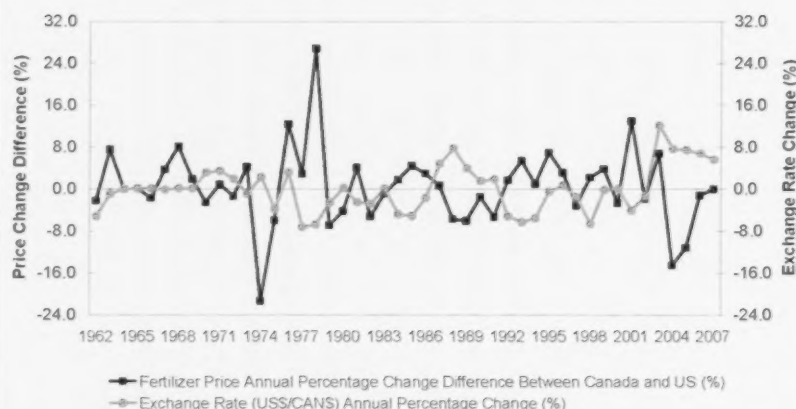
average prices paid for fertilizer in Canada decreased by about 13% in 2009. This 13% decrease in fertilizer prices translated into about a \$644 million decrease in Canadian farmers' 2009 fertilizer bill.

In 2010, fertilizer prices will continue to decrease in response to the weak worldwide fertilizer demand due to the still struggling global economy, as well as to low natural gas prices. AAFC forecasts that the average prices paid for fertilizer in Canada will likely drop another 15% in 2010. However, world population will continue rising, and people are going to continue eating more protein-rich, fertilizer-dependent foods, particularly in the high

economic growth Asian countries. In addition, biofuel needs are driving up grain requirements. As a result, expected high levels of crop plantings, particularly in China, India and Brazil, will contribute to maintaining a tight global fertilizer supply and demand balance, resulting in strong prices in the long term.

Figure 10

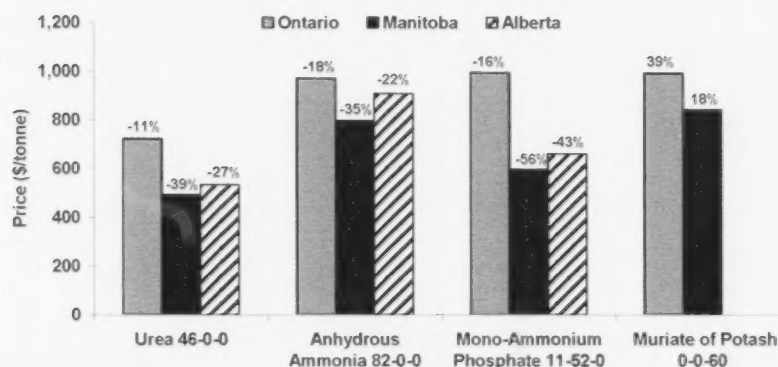
FERTILIZER PRICES AND CANADIAN EXCHANGE RATES



Sources: (1) USDA National Agricultural Statistics Service (NASS), and BLS (Bureau of Labor Statistics); (2) Statistics Canada; (3) AAFC calculations.

Figure 11

ONTARIO, MANITOBA AND ALBERTA 2009 FERTILIZER PRICES AND PERCENT CHANGE FROM 2008



Source: (1) AAFC Farm Input Price Survey; (2) Alberta Agricultural Input Monitoring System (AIMS), Alberta Agriculture and Food, Economics and Competitiveness Division, Statistics and Data Development Unit; (3) AAFC calculations.

FARM FERTILIZER USAGE

Using 1983-2007 annual historical data, the elasticity for fertilizer demand with respect to seeded area of grain and oilseeds was estimated to be 1.3 in Canada. In other words, on average, a 1% increase in seeded area resulted in a 1.3% increase in fertilizer use. In terms of the estimated elasticity and other factors such as seeded area, fertilizer costs and crop prices, fertilizer usage was estimated to have increased by 3% in 2009 in Canada. Farmers who might have cut back on fertilizer rates in previous years due to higher prices returned to their normal fertilizer application, which also contributed to this increase. In 2010, AAFC projects Canadian fertilizer usage will likely decrease by 6% due mainly to severe flooding in the Prairies, which left a large area unseeded.

FARM FERTILIZER EXPENSES

Farm fertilizer expenses include all costs associated with the purchase of fertilizer and lime, including application if it is part of the cost. In Canada, when the price and usage changes are considered together, fertilizer expenses were estimated to reach \$3.3 billion in 2009, a decrease of 15% over 2008 and above the 2004-2008 average annual expenses of \$2.9 billion. Fertilizer expenses in 2010 are forecast to drop from 2009, to \$2.5 billion, below the recent 2004-2008 average.